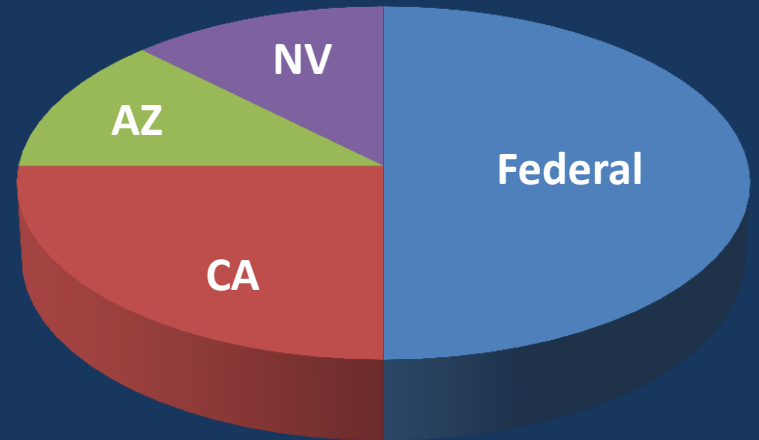


Monitoring Bats at Riparian Restoration Areas along the Lower Colorado River

Allen Calvert

Overview of the LCR MSCP

- The LCR MSCP is a 50-year cooperative Federal-State-Tribal-County-Private effort to manage the natural resources of the lower Colorado River (LCR) watershed, provide regulatory relief for the use of water resources of the river, and create native habitat types along the LCR.
- Implementation began in 2005
- Total Program Cost
\$626 million (2003 dollars)
Adjusted Annually for Inflation
- Just over \$23 million was spent in FY14
- Federal / State Cost Share
Split 50/50
States share is split 50% CA, 25% AZ, and 25% NV



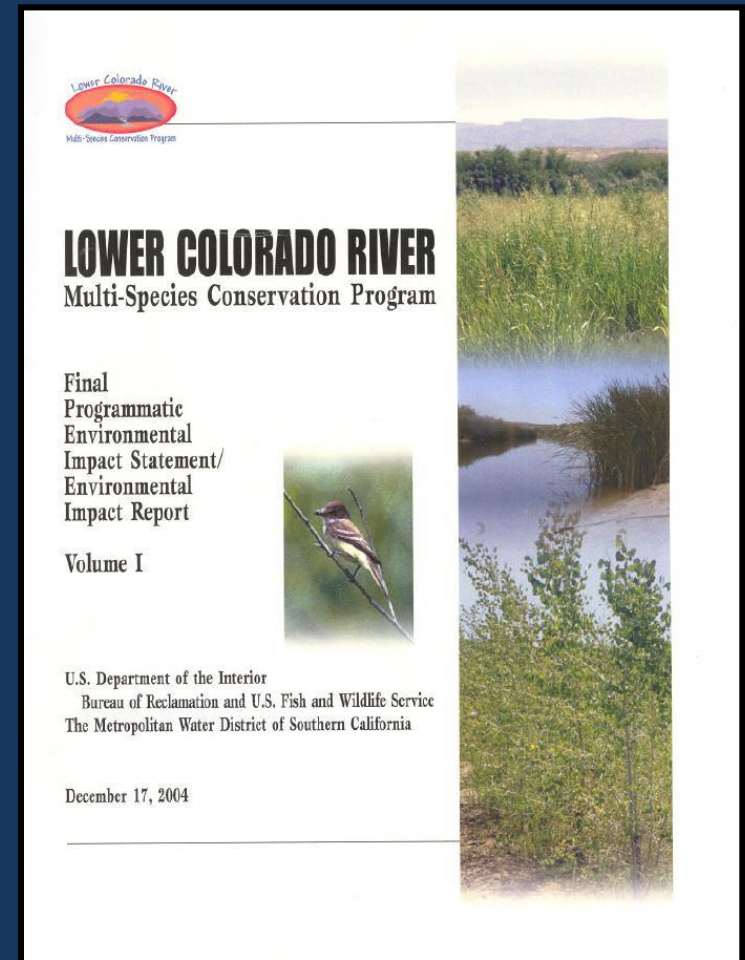
Goals of the LCR MSCP

- Conserve habitat and work toward recovery of Threatened & Endangered species as well as reduce the likelihood of additional species being listed
- Accommodate present water diversions and power production and optimize opportunities for future water and power development
- Provide the basis for incidental take authorizations

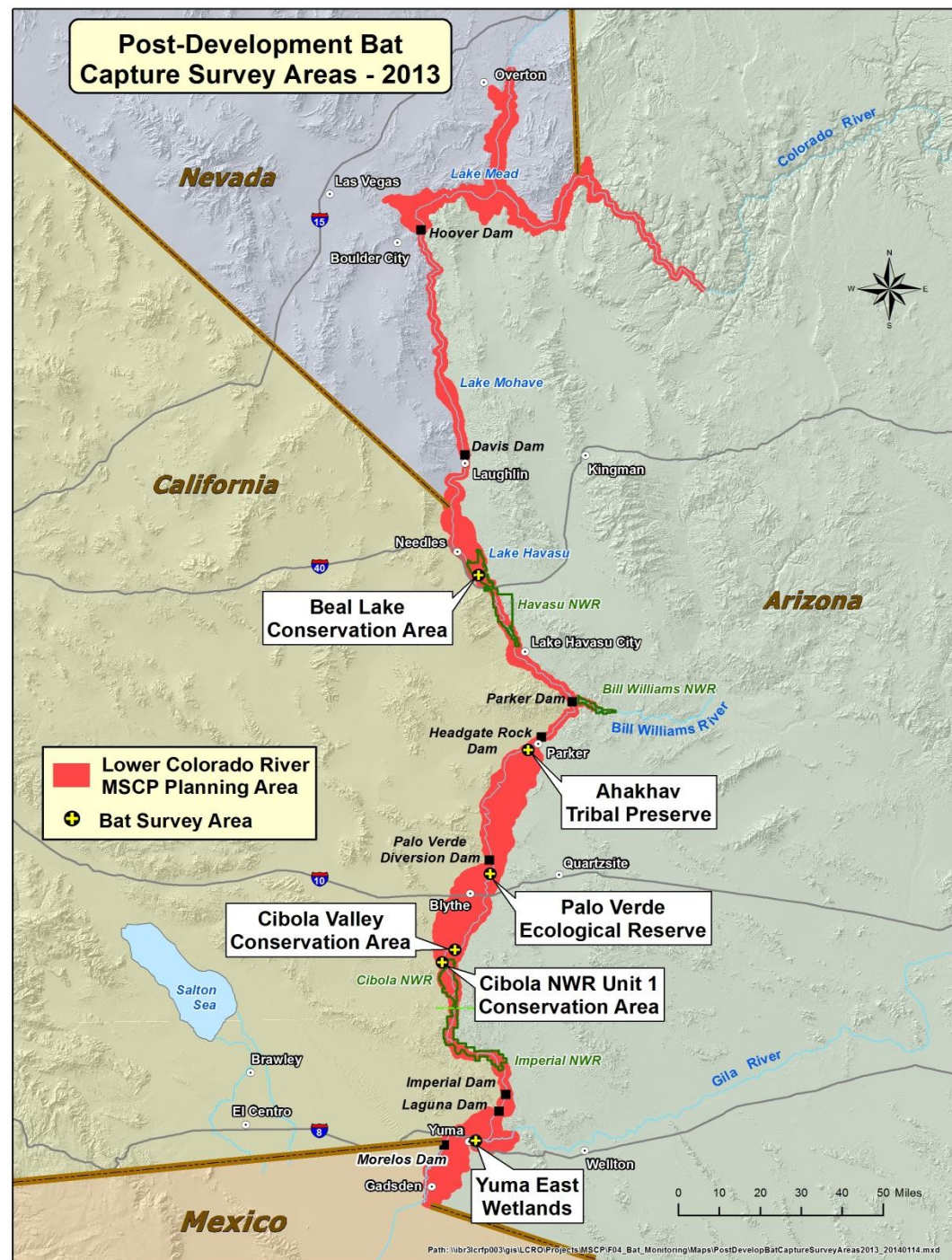


How Goals are Being Achieved

- 50-Years of ESA and CESA (for CA Parties) Compliance
 - Unique - Section 7 and 10
 - Habitat Conservation Plan
- Every species has specific *conservation measures* that must be met during the 50 years of the program
- More general research and monitoring *conservation measures* ensure habitat created or conserved meets the needs of the species



- The upper reaches of the program area are primarily focused on native fish conservation
- Riparian conservation areas are located below Lake Mohave, within the 100 year floodplain of the river
- Bat monitoring is conducted at 6 of the 9 current MSCP conservation areas



Covered and Evaluation Bat Species

Western Red Bat
(*Lasiurus blossevillii*)



Townsend's
Big-Eared Bat
(*Corynorhinus townsendii*)



California Leaf-Nosed Bat
(*Macrotus californicus*)



Western Yellow Bat
(*Lasiurus xanthinus*)





Cibola Valley Conservation Area (CVCA)



Palo Verde Ecological Reserve (PVER)

Methods

- Two methods are being utilized to monitor bats at LCR MSCP conservation areas
- Acoustic Surveys - Bat detectors record echolocation calls of bats and can be used to collect an activity index of each species detected at a site.
- Capture Surveys – Mist nets are deployed to attempt to capture covered bat species to determine age, sex and reproductive status



Why Both Methods?

- Different species are better detected using different methods
- Red and yellow bats can easily be detected using both methods
- California leaf-nosed bats and Townsend's big-eared bats are considered “whispering” bats that echolocate at very low decibels, making them difficult to detect using acoustic methods
- Sex, age and reproductive status can only be determined using capture methods
- Neither method can be used to estimate abundance, however acoustic surveys provide an activity index for each species

Acoustic Methods

- Bat detectors are deployed via long term monitoring stations
- Detectors turn on every night and record the calls of all bats that fly close enough to the microphone to be recorded



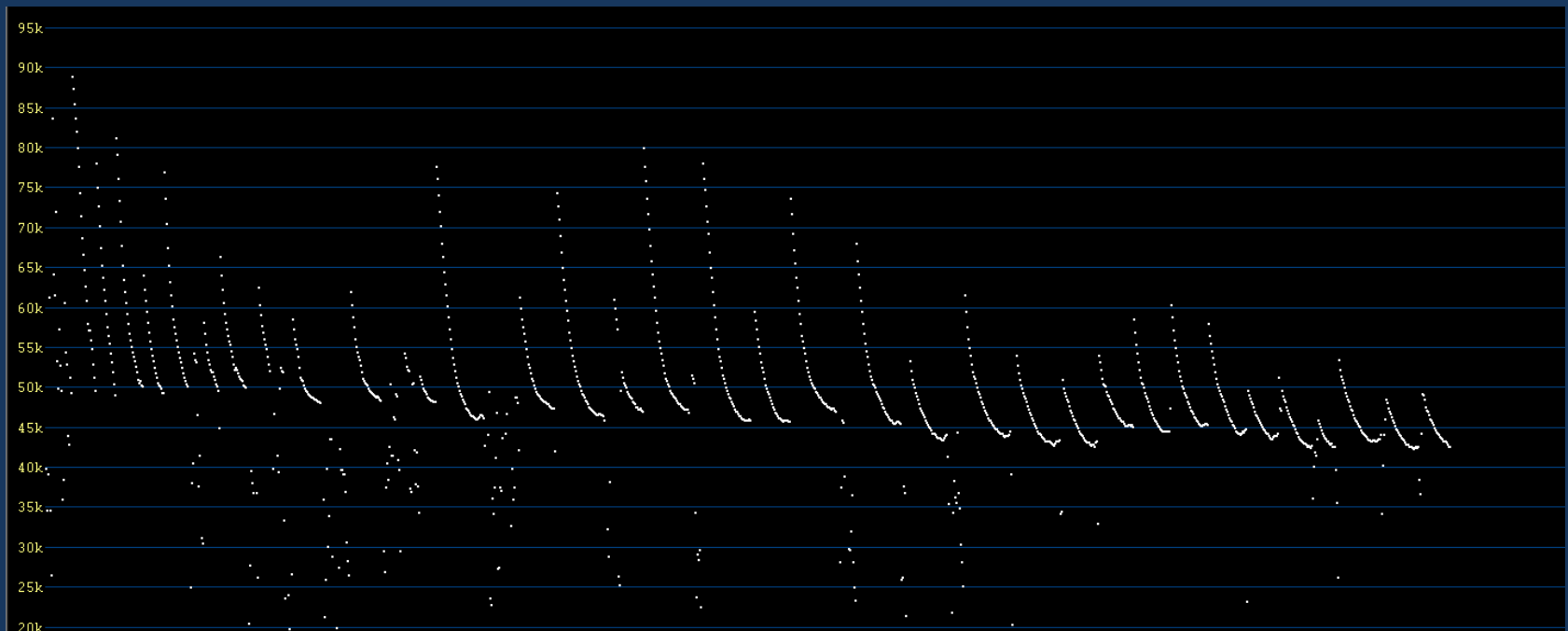
Acoustic Methods

- The detector microphone is set at 25 or 40 ft to avoid insect interference
- To access the microphone and solar panel, the pole can be lowered by a winch
- At least one station is operating at each conservation area. Two conservation areas have two stations



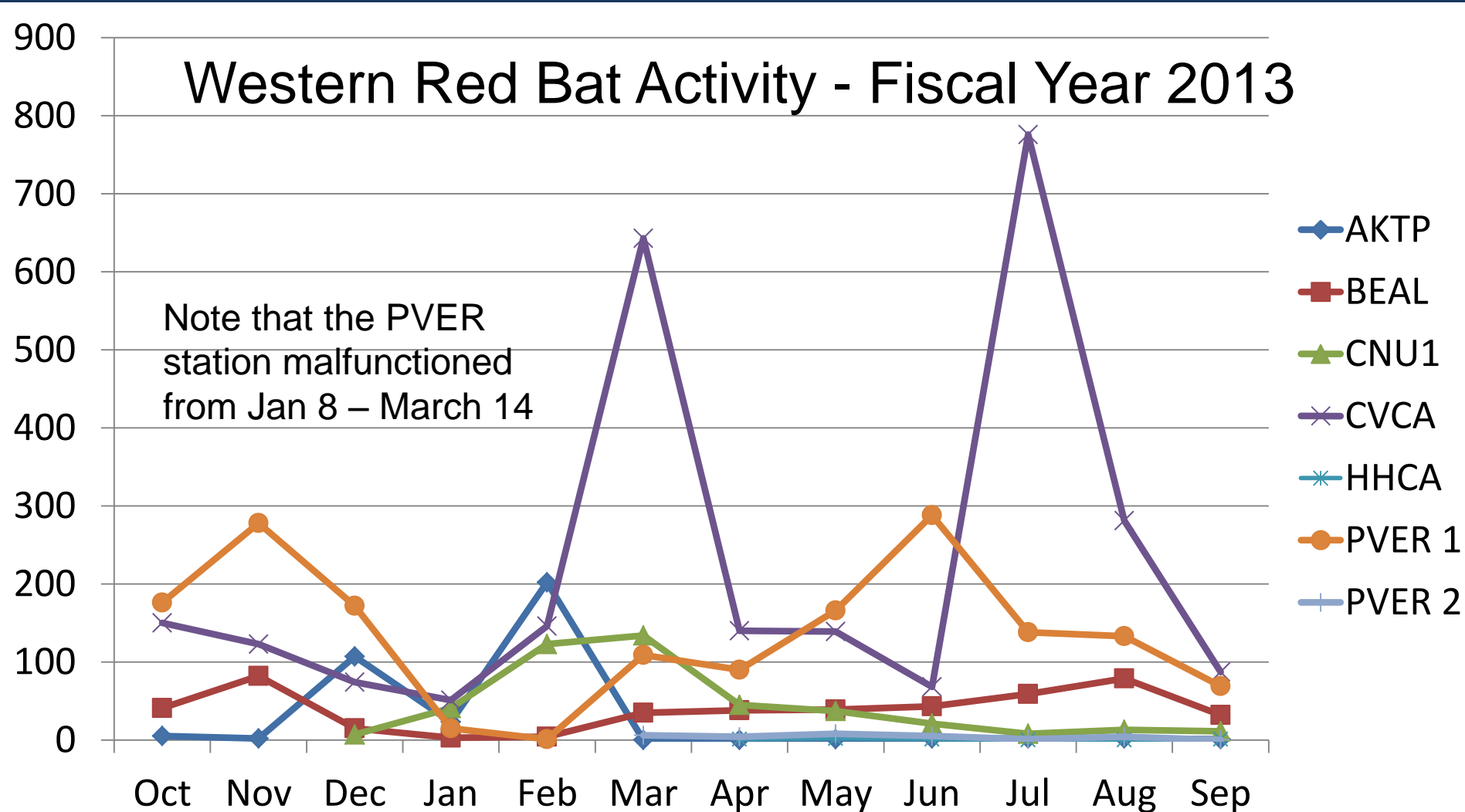
Acoustic Methods

- Bat call files are identified by species or species group. Bat call files for each night are processed in one minute intervals for each species so that a species cannot have more than 60 minutes of activity within an hour.
- These “bat minutes” reduce potential bias of having the same individual bat flying by the microphone multiple times within a given minute.



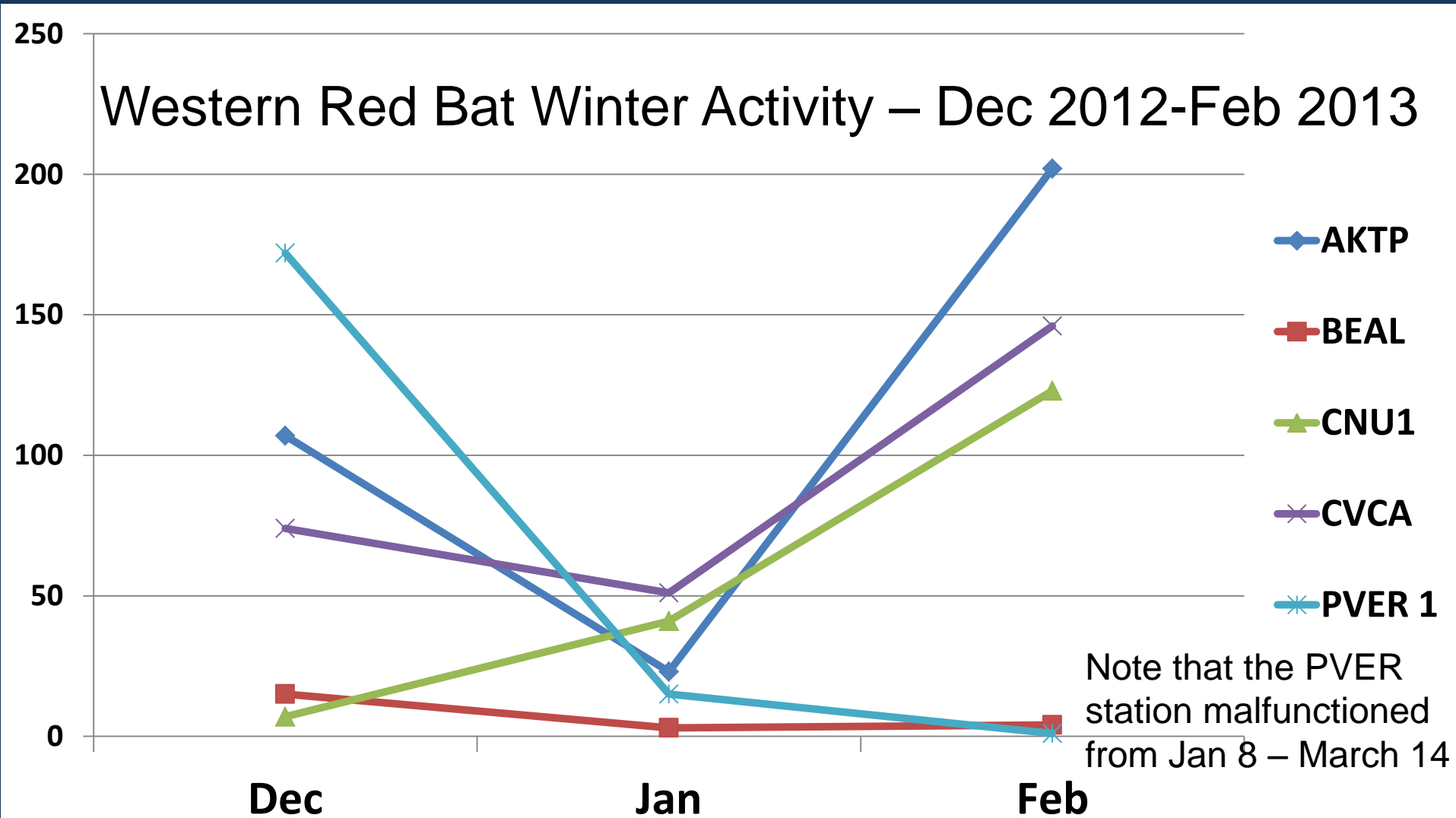
Results

- Acoustic data can be compared between years or between sites.

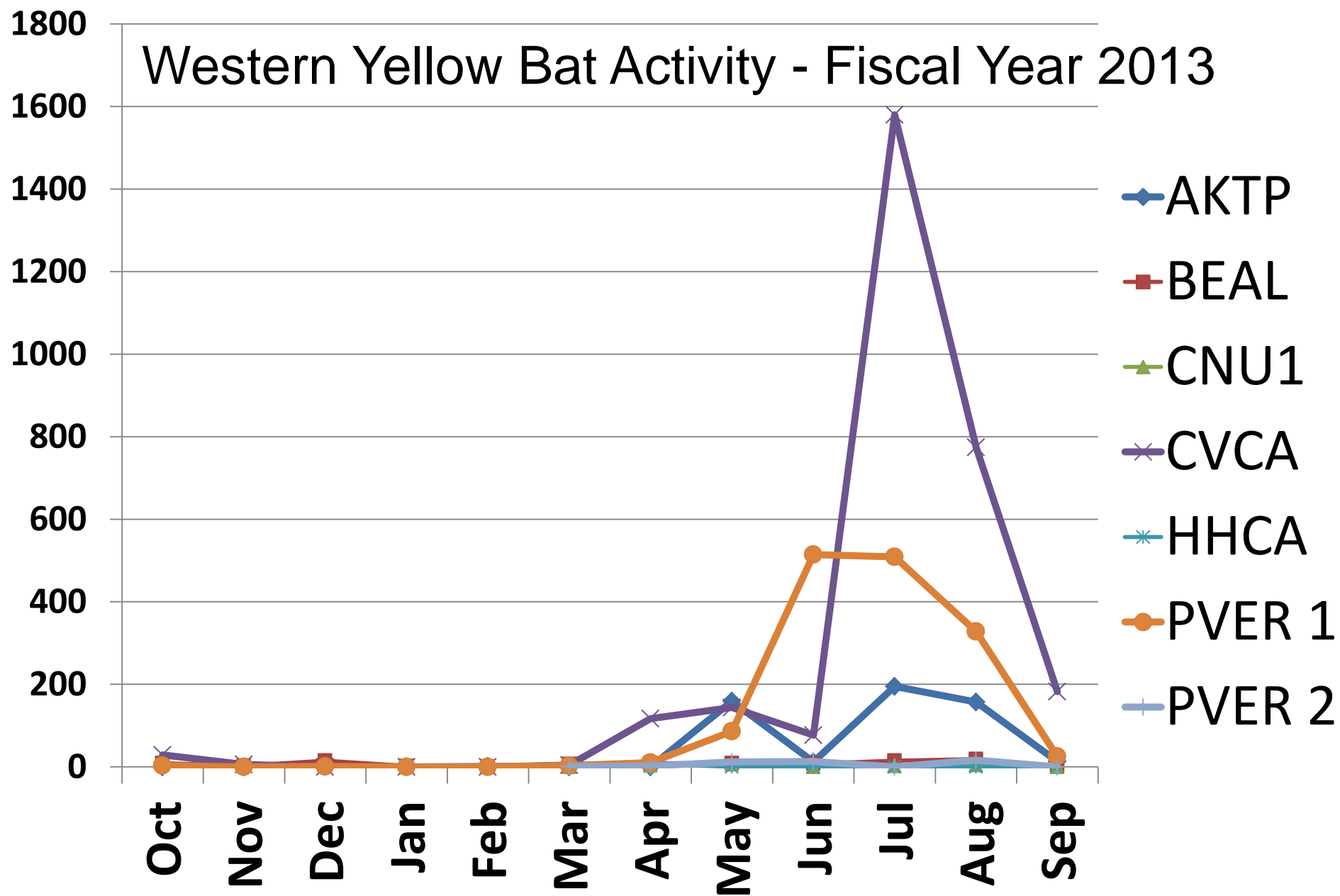


Results

- Acoustic data can be compared between sites, seasons, and years



Results



Capture Methods

- Each site was surveyed once per month from May-September (some sites had an exploratory survey in February)
- Surveys started a half hour after sunset and continued for 4 hours (weather permitting)
- Three triple high mist-nets were used at all sites
- Net length varied from 6-18 meters



2014 Results

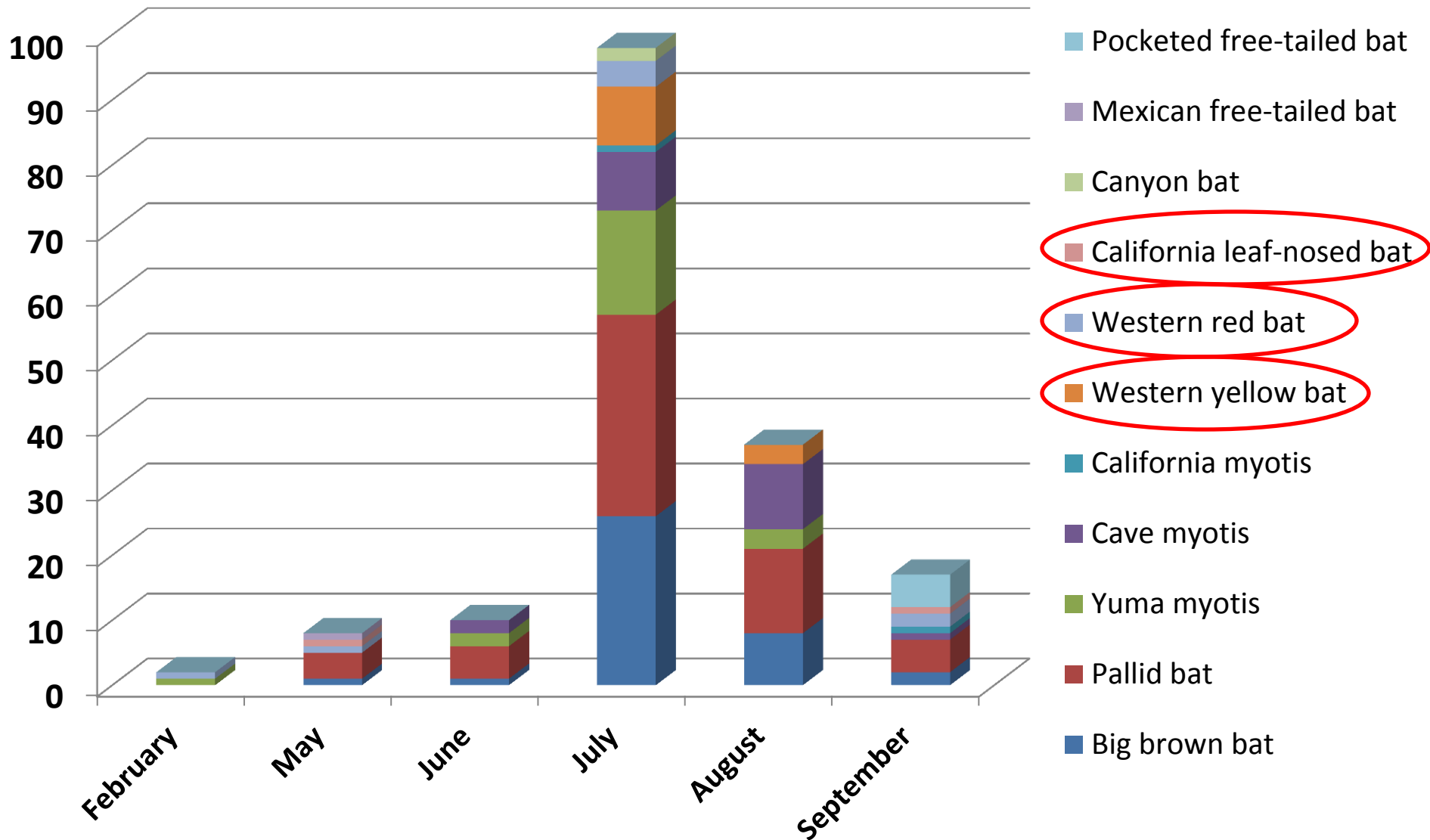
Cibola Valley Conservation Area

- An edge, and a corridor (L-formation) were surveyed
- 172 bats of 11 species were captured
- 57% of all bats captured during July survey
- Three MSCP species captured



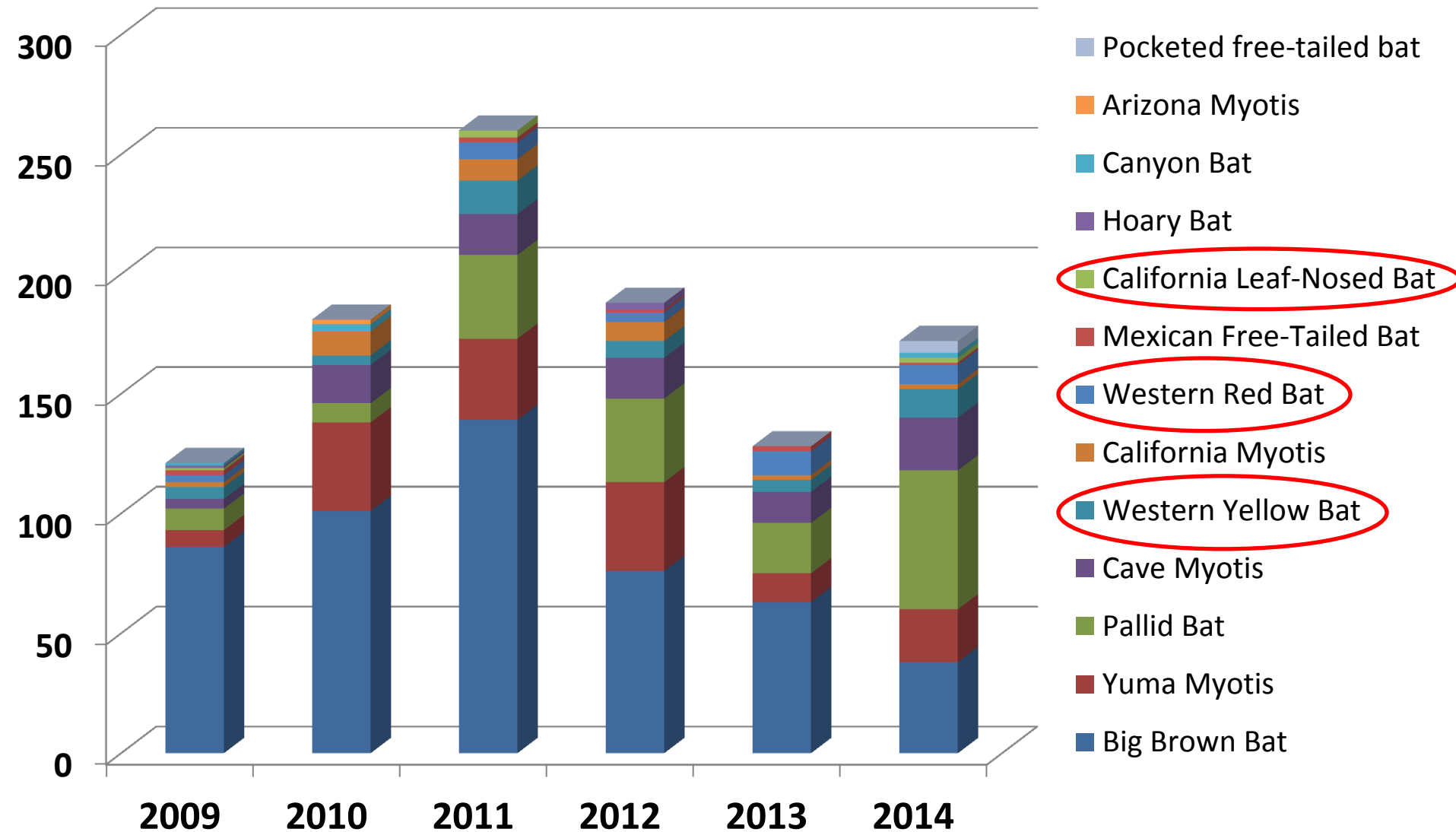
Species Composition - 2014

Cibola Valley Conservation Area



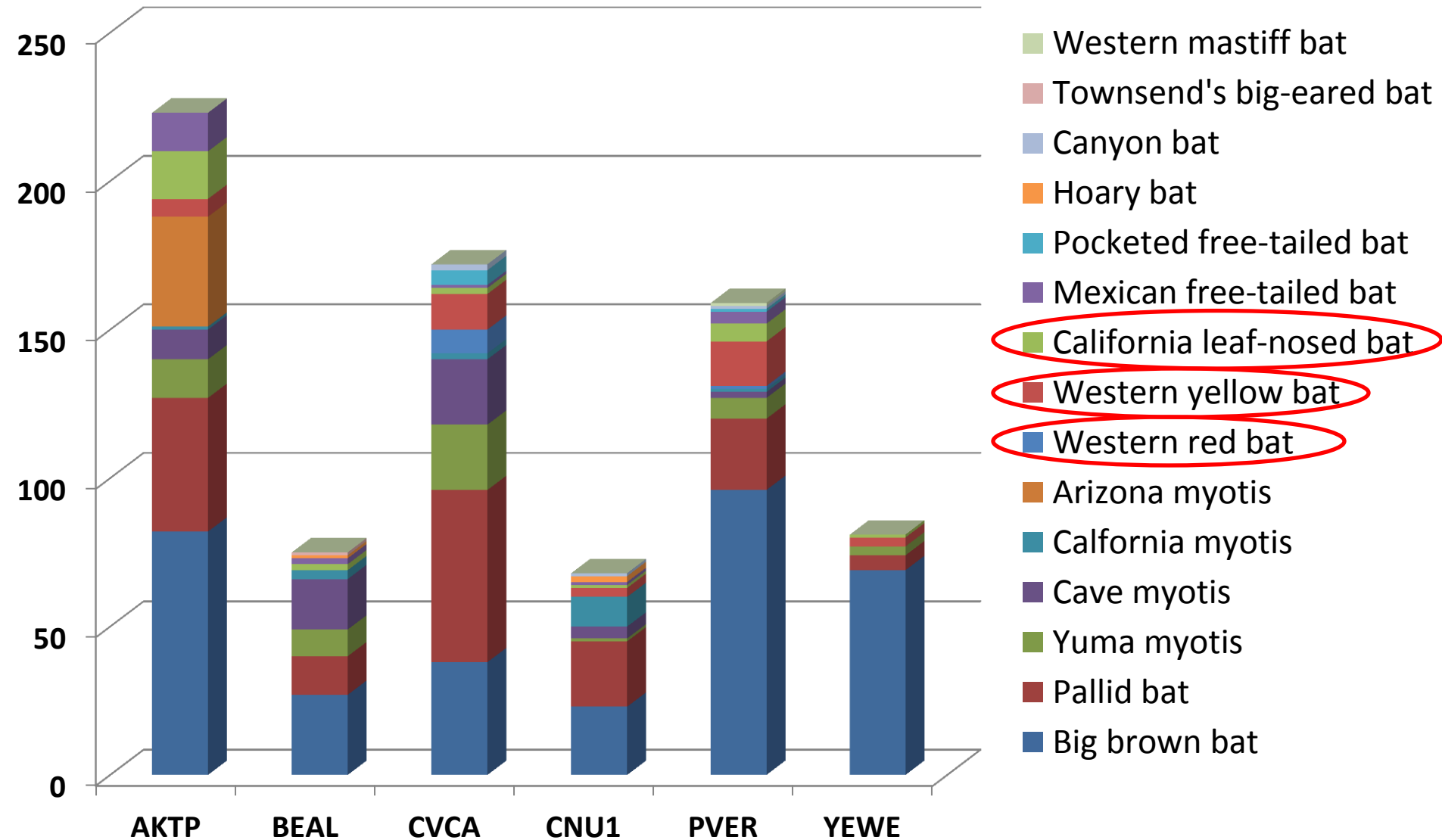
Species Composition Between Years

Cibola Valley Conservation Area



Species Composition

All Sites – 2014



Summary Results - 2014

All Sites

- 36 survey nights across 6 sites
- 778 bats of 15 species were captured
- 28 California leaf-nosed bats captured (all 6 sites)
- 39 western yellow bats captured (5 sites)
- 9 western red bats captured (2 sites)
- 1 Townsend's big-eared bat captured (1 site)

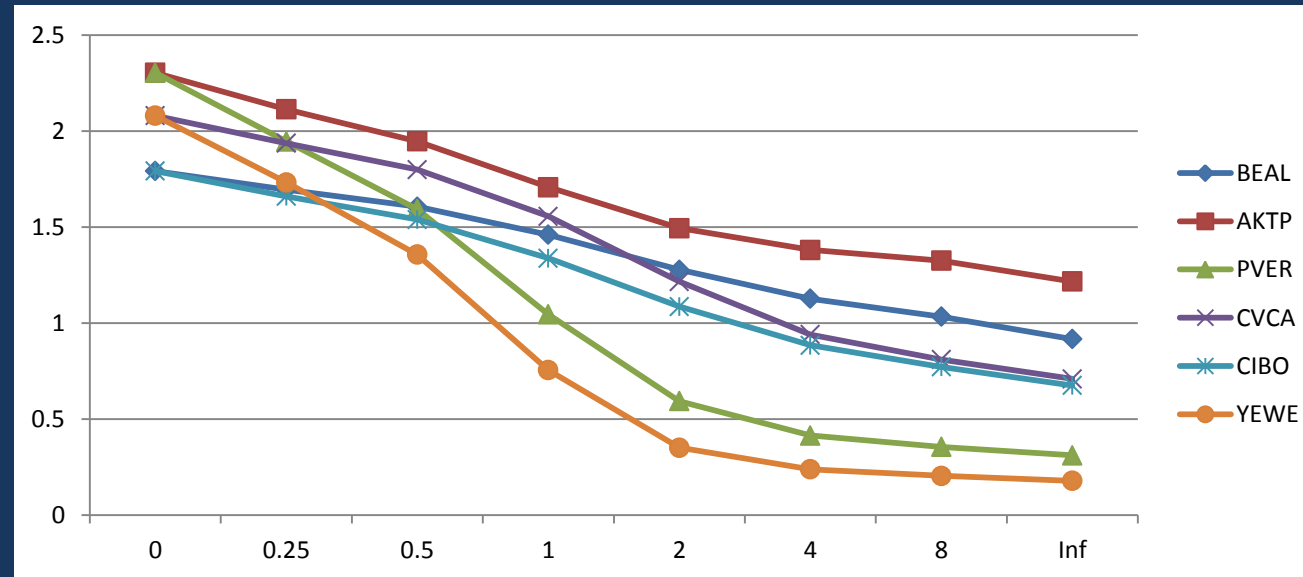


Species Diversity

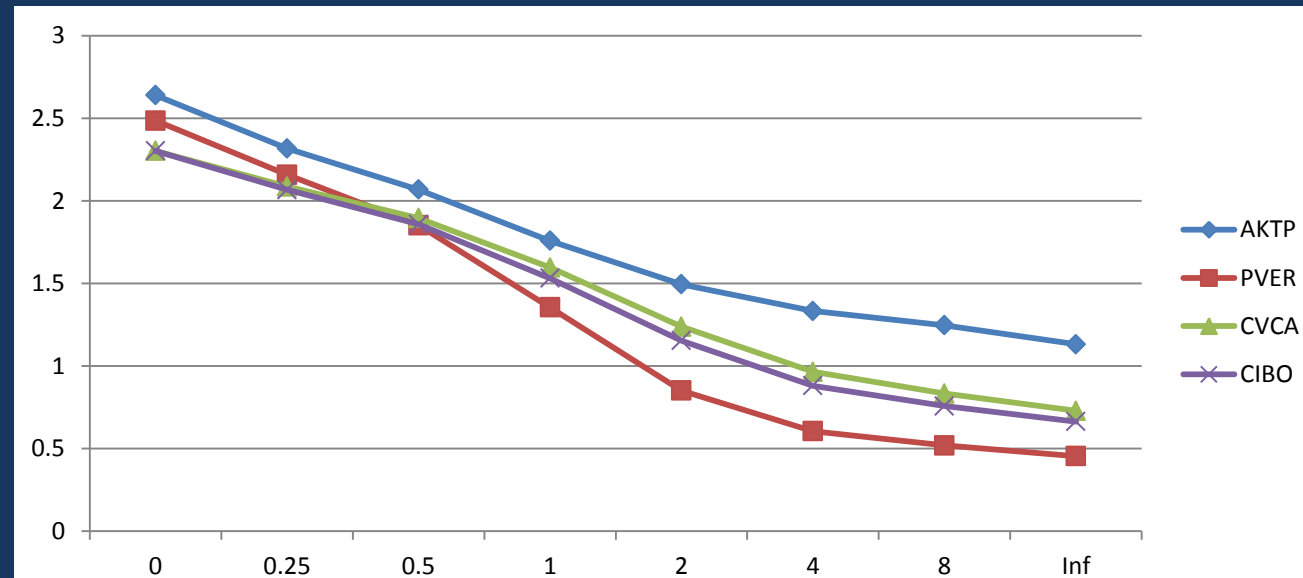
- Because all species diversity indices are biased, Renyi diversity profiles are used to compare sites and years
- The more horizontal the profile, the more evenly species are distributed
- Main indices that the Renyi profile uses are: richness, Shannon, Simpson, and dominance
- Program R (using Rcmdr) with the BiodiversityR GUI was used to create Renyi profiles

Renyi Diversity Profiles

2013 data only:



2011-2013 data combined:



Conclusion

- In order to adequately sample an area to assess the overall bat community, both acoustic and capture methods are necessary
- If there is a budget constraint, acoustic surveys should be the focus, unless your target species is a “whispering” bat
- Multiple locations need to be monitored to ensure as many potential species as possible can be detected



LCR MSCP Annual Meetings

- Colorado River Aquatic Biologists (CRAB) Meeting
 - January 7-8 in Laughlin, NV: 2 days of presentations and discussions that allow for regional natural resource groups to engage in general fisheries and aquatic-related discussions relative to the Lower Colorado River Watershed.
- Colorado River Terrestrial and Riparian (CRTR) meeting
 - January 27-29 in Laughlin, NV: 2.5 days of presentations and discussions that facilitate communication and information sharing for individuals or groups working with native restoration and natural resources monitoring and research related to the Lower Colorado River Watershed.

See the “Outreach” section of our website for more details www.LCRMSCP.gov



Questions?



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